the 27th, in Minnesota; St. Paul barometer 0.21 below the normal. Central that afternoon in southwestern Wisconsin, it moved, during the night, northeastward into British America. No signals were displayed during the passage of this area. The only case of high wind reported was Milwaukee, N. 32.

No. XV.—During the night of the 27th the pressure fell rapidly in the northern Plateau district; afternoon barometer at Virginia City 0.24 and at Salt Lake City 0.21 below the normal. The lowest pressure remained in Utah or Idaho until the 30th, when it was transferred to the Eastern Rocky Mountain Slope. Missing reports prevent its centre being located. The highest winds of the month were on that day reported in that district as follows: North Platte, N. 44; Cheyenne, NW. 32; Ft. Keogh, W. 40; Deadwood, S. 25. During the 31st the area moved northeastward into Manitoba.

No. XVI.—A sufficient number of reports have not been received at this date (September 13th) to enable the accurate charting and description of this storm. No Signal Service reports from August 29th to 31st south of Jacksonville are yet at hand. This storm evidently formed to the northward of San Domingo and passed eastward to the north of the Bahamas. The hurricane which passed over the Bermudas on the 29th and 30th may possibly have been an offshoot of this area, but this is hardly probable, as on August 25th, in latitude 25° 30′ N. the brig *M. A. Doran* reported heavy NNE. gale veering to NW., with barometer rapidly falling from 30.40 to 29.50; bearing southward she avoided the hurricane but met at midnight heavy squalls and bad sea. On the succeeding day, August 26th, schooner *S. A. Snow* was wrecked by this hurricane 128 miles SE., of the Bermudas. On the same day brig *St. Jose* was dismasted "south of Bermudas," no position given. Ship *Sunrise* on the 26th, in 26° N., 69° W., fell into the SW. quadrant of a violent hurricane, moving NNW. These reports indicate that the Bermuda hurricane originated south of 25° N., and to the eastward of 61° W., and curved southward of the Bermudas. The Florida hurricane was located on the 27th in 25° 50′ N., 74° 10′ W., where it overtook the steamship *Santiago* at noon; hurricane wind NNW., NE. sea; barometer 29.80. At midnight wind shifted to very heavy SW., and high cross seas; barometer 29.49; after which wind and sea moderated. On the 28th the steamship *New Orleans* was struck by the cyclone at 8 p. m., 40 miles ENE., of Jupiter Inlet about 27° N. In both these cases winds backed from NNW. to SE., showing that the hurricane passed to the northward. On the same date the *Morgan City*, of Florida coast, experienced a hurricane from the W., backing to SE., and lasting till the 29th; barometer fell from 30.00 to 28.79. On the 29th the steamer *Vera Cruz* foundered on the Florida coast off the St. John's river, many lives lost. A number of other vessels were wrecked or disabled on the Florida coast between Jupiter Inlet and St. John's river. During the 29th and 30th the hurricane passed across Florida. At Cedar Keys the storm was one of the worst ever known. On the morning of the 30th the wind reached its maximum,—64 miles NE. registered, after which time the registering apparatus was disabled. During the 30th and 31st, 6.73 inches of rain fell. The lowest barometer reading reported was 29.40 at 2 p. m., of the 30th. One vessel, the bark *Proteus*, at Cedar Keys, was dismasted and otherwise damaged. Several buildings were blown down and others damaged; on the railway between Cedar Keys and Fernandina several serious washouts occurred. During the 31st the storm moved slowly northeastward through Florida into Alabama with rapidly increasing pressure and decreasing violence. At Pensacola the highest wind SW. 32 and lowest barometer 29.33 were reported on the 31st. At midnight of the 28th Cautionary Signals were ordered for all Florida stations except Pensacola, and on the following day for Pensacola, Mobile, Port Eads, and as far north as Sandy Hook. Owing to interruption of telegraphic communication, signal orders failed to reach Cedar Keys and Key West. On the 29th special messages announcing the cyclone were sent to all Atlantic and Eastern Gulf seaports. The signals from Savannah to Wilmington and Norfolk were lowered on the 30th, and at other stations on the 31st. These signals were justified, except on the North Carolina coast; maximum wind velocities were reported as follows: Cedar Keys, NE., 64; Barnegat, NE., 42; Pensacola, SW., 36; Cape May, NE., 36; Delaware Breakwater and Jacksonville, NE., 32; Key West, SW. 32.

## INTERNATIONAL METEOROLOGY.

Three International charts, Nos. IV, V and VI, accompany the present Review. They are for the months of *July*, 1880 and *December*, 1878.

On chart No. IV will be found the probable course of the principal low barometer areas over the North Atlantic Ocean during the month of *July*, 1880. Three of them, II, IV and V, are extended tracks of low areas, II, V and VI of the July REVIEW, chart I, and appear to have curved northward before reaching the 50th meridian. Four of them, I, III, VI and VII appear to have originated to the east of the 20th meridian on the 1st, 6th, 14th and 17th respectively. Reports at present to hand indicate continued high pressures and light winds over the central portion of the ocean, (between the parallels of 30 and 50) from the beginning of the month to the 22nd. On the 23rd a decided fall set in from the northward, over the eastern portion, which during the 24th gradually extended westward to 45° W. forming an extensive area of low barometer, which on this day probably included the whole of the Atlantic north of the Azores. During the 25th and 26th it appears to have moved southeastwards towards the British Channel and its path is marked upon the chart as No. VIII. On the 27th, another area, No. IX seems to have developed to the west of Ireland and subsequently to have moved eastward toward the North Sea. On the 30th and 31st quite high pressures were again recorded over mid-

ocean. The following summary of extracts from the logs of ocean steamers on 46 voyages between the United States and Europe, (as given in the *N. Y. Maritime Register*,) during the month will serve to illustrate the unusually fine weather prevailing. Out of an aggregate of 345 daily reports, "rain squalls" were reported in 6 cases, "squally weather" in 7 cases and "moderate gale," the highest wind recorded, in only 3 cases. Of these 16 cases, 11 occurred to the east or west, respectively, of the meridians of 17° and 47° W and attended the low areas shown on chart. The other 5 cases, which included two of the "moderate gales," occurred after the 22nd and attended areas Nos. VIII and IX. Out of an aggregate of about 176 daily simultaneous observations taken on 22 voyages between the two continents and reported directly to this Office, only 6 cases were reported of winds over force 6 on Beaufort scale. Three of these were moderate to fresh SW'ly gales experienced in connection with area No. IV on the 11th and 12th, and reported by steamers *Indiana* and *Braunschweig*, and the other three, northwesterly moderate to strong gales in connection with areas Nos. VIII and IX, reported by steamers *Indiana* and *Scythia* on the 28th, 30th and 31st. The following storms of limited extent were reported along the American coast: From the 7th to the 11th, bark *Ivigtut* experienced a southerly gale, with heavy squalls, along the southwest coast of Greenland. On the midnight of the 9th, ship *Jumna*, at Sydney, C. B., experienced a very heavy storm of wind and rain, and heavy thunder and lightning, lasting 2 hours, and on the 17th, schooner *Addie Fuller*, in 33° 40′ N. 78° 40′ W., had a severe thunder-storm which lasted about two hours—rainfall in about 1 hour and 45 minutes, 1.97 inch; the wind blew in fearful gusts from NW., and the disturbance seemed to move from WNW. toward SSE. On July 28th, steamer *Sceptre*, in 39° 47′ N. 68° 18′ W., passed a well-defined waterspout within half a mile of the vessel, traveling rapidly to ENE.; weather at the time overcast and and gloomy, with heavy rolling swell from the SSE.

Upon chart No. V are shown for the month of *December* 1878, the mean pressure, mean temperature, mean force and prevailing direction of winds at 7:35 a. m. Washington mean time, (0:43 p. m. Greenwich mean time) for the northern hemisphere, and at certain detached stations in the southern hemisphere. High pressures (30.20 in. or 767.1 mm. and above) covered in Asia, the greater part of Siberia and in America, a wide belt of country, extending from the Gulf of Mexico to the Oregon coast. Low pressures (29.80 or 756.9 and below) covered all of northern Europe, and in America, an area about 10 degress wide, extended from the Canadian Maritime Provinces southeastward over the Atlantic ocean to about 30° W. The lowest isobar, 29.60 or 751.8 included Denmark, the North sea, Southern Sweden and the extreme eastern coast of Norway. The lowest pressure, 29.39 or 746.5, prevailed at St. Paul's Island, Behring's sea, and the highest 30.59 or 777.0 at Yeniseisk. The highest barometric reading noticed was 31.26 at Yeniseisk, Siberia, December 23rd, 1878, and the lowest 28.03 at St. Paul's Island on December 31, 1878, showing a range of 3.25 inches for the northern hemisphere. As compared with the chart of mean pressure for December 1877, the barometric conditions present little if anything in common. In 1877, the high pressure in Siberia was much further eastward, the area of comparative low pressure in the interior of the United States had (in 1878) given place to an area of high pressure, and the area of lowest pressure then over Iceland had withdrawn southward and given place to a mean at Stykkisholm of 30.10 as against 29.25. Over the Azores the high mean pressures were replaced by a pressure averaging 0.50 lower. A remarkable range of mean pressures in the northern hemisphere is shown for December, 1878, being 1.20 inch—from 29.39 at St. Paul's Island to 30.59 at Yeniseisk. As compared with the mean pressure for November, 1878, the following are the greatest changes: St. Michael's, +0.47; Yeniseisk, +0.23; St. Paul's Island, +0.22; Ekaterinburg, +0.21; Barnaul, +0.20; North Atlantic ocean between 40° and 50° N., 30° and 40° W. —0.37; Kertch, —0.31; Angra, —0.24; Ponta Delgada, —0.23; Moscow, —0.22; Sandwick and Constantinople, —0.20; Valentia and Tokio, —0.19. The regions of highest pressure and lowest temperature are nearly coincident over Siberia. A remarkable feature of the temperature in December is the unusually high temperature in Greenland, 31°.0 at Godthaab, and northeastern coast of America, where nearly the same temperature prevailed as in the preceding month; at Godthaab on December 6th, the unusually high temperature of 56° is noticed. In general *southwesterly* winds prevailed in Europe and Algeria; *northwesterly* winds in America (except on the Pacific coast, where they were *northeasterly*), and the Atlantic ocean W. of longitude 40° W. Over the rest of the Atlantic, the winds were *southwesterly* S. of latitude 40°, and *northeasterly* north of that parallel and in the British Isles. The predominating winds in Asia, where calms did not prevail, were, *northwesterly* in India, *southeasterly* in Siberia, and *northeasterly* along the entire eastern coast.

On chart No. VI are traced the paths of twenty-six of the principal storm-areas of the Northern Hemisphere for the month of *December*, 1878. The recurving of the paths of storms noticed in the REVIEW of last month, as occurring in the storms of November, 1878, is strongly marked in those of December in areas II, VIII and XXI. The southerly positions of the paths over the eastern portion of the United States, the Atlantic ocean and Europe, the rapid progressive motion of storms along the Atlantic coast of the American continent, and their retarded progress over the central and eastern portions of the Atlantic ocean are marked features.

## TEMPERATURE OF THE AIR.

The mean temperatures for August, 1880, are shown by isotherms on chart No. II. The table of average temperatures on that chart shows a deficiency of temperature for the entire country, except